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DOCUMENT CLEARANCE REQUEST — Part 1 – Issuing Manager's Approval

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SECTION 1 — Clearance Information

1. Date Clearance Required	2. Document Identification	2a. Previous Document Identification
April 9, 1990	WHC-ARH-CD-948	

3. Title (Include UC Category)	4. Author's Name(s)	5. Phone	6. MSIN
HISTORY AND STATUS OF TANKS 241-C-105 AND 241-C-106	Atlantic Richfield Hanford Company		

7. Desired Clearance/Release
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10. ☐ To Be Published in Journal ☐ Handouts for Attendees Official Publishing Month:

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11. WHC Program: Waste Management

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Document is approved as conforming to all applicable requirements. The above information is certified to be correct.

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HISTORY AND STATUS OF TANKS 241-C-105 and 241-C-106

C. M. Walker

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ERRATA:

Page 3, 1st Paragraph - It is stated that tank 241-C-105 was filled to capacity during July-August 1954 with Tributyl Phosphate (TBP) waste which was treated with potassium ferrocyanide. The ferrocyanide treatment of TBP waste was not initiated until September 1954, therefore the waste in 241-C-105 did not contain ferrocyanide.

Page 4, 1st Paragraph - It is stated that between July 1947 and August 1963, the process history of tank 241-C-106 is virtually identical with that of tank 241-C-105. Tank 241-C-106 received TBP waste in August 1954, before ferrocyanide treatment was initiated.

HISTORY AND STATUS OF TANKS 241-C-105 and 241-C-106

C. M. Walker
Operational Process Engineering
Engineering
Production and Waste Management

May 1, 1977

Operated for the Energy Research and Development Administration
by Atlantic Richfield Hanford Company under Contract EY-76-C-06-2130

TABLE OF CONTENTS

History and Status of Tanks 241-C-105 and 241-C-106

INTRODUCTION

Tanks 241-C-105 and 241-C-106 have been in active radioactive waste storage service since 1946 and therefore represent the oldest generation of UGS tanks within the Hanford reservation. Due to their recently terminated application to the processing of Purex self-boiling wastes, both of these tanks now contain sludges which may have radionuclide concentrations in excess of the amount that can be dissipated to the surroundings by natural means. This document is a summary of the process history and status for each of the two tanks.

CONCLUSIONS

- The results of special studies involving tank temperatures, psychrometry, and sludge compositional analyses summarized in Tables III through VI corroborate a conclusion that the tanks 241-C-105 and 241-C-106 both contain excessive quantities of heat generating radionuclides, estimated as being greater than 90,000 and 100,000 BTU per hour respectively. A plan must therefore be developed for safeguarding the tanks and their contents. Available alternatives are sluicing (per reference 3) and sludge cooling (per reference 4).

- Both of the tanks have been in active service for more than thirty years, and their continued use as repositories for liquid radioactive waste is not amenable to the objectives of the Atlantic Richfield Hanford Company long term waste management plan.

- The present profile temperature probes are not properly situated within tanks for the provision of reliable temperature data.

- Facilities for continuous psychrometric monitor of the tank off-gas system would provide a more reliable assessment of the tanks' mass transfer characteristics.

- The vessel ventilation system presently installed in conjunction with Tank 241-C-105 and -106 is not adequate for the cooling of dried sludge. An adequate sludge cooling system will be needed after FY 1980 when the tanks are retired from active service, and liquids are removed and concentrated.

TANK HISTORIES

Tables I and II, pages 10 through 22, are waste status history summaries of tanks 241-C-105 and 241-C-106 respectively. Of significant note, and pursuant to the objective of this review, is the fact of a sparcity of solids measurement information. Also, what little data is available is based upon single location measurements. It is evident that the historical records for the tanks are inadequate bases for deriving volume measurements for specific solids types. Statements of heat generation rates for these sludges, which are made in the following discussions are therefore based upon best estimate judgement of the sludge volume.

Figures I and II, pages 8 and 9 are offered as illustrations of the tanks and their status. Figure I is a schematic plan of the two tanks, showing arrangement of the tank facilities, and Figure II shows the tank elevations and estimates of sludge volumes and rates of heat generation.

TK-105-C

Tank 241-C-105 entered radioactive waste storage service during the first quarter of 1947 when it received Metal Waste (MW) from the Bismuth Phosphate Process. The tank was the second in a cascade. MW from the extraction contained all of the uranium, 90 percent of the original fission product activity and approximately 1 percent of the product (Pu). This waste was brought just to the neutral point with 50 percent caustic and then treated with an excess of sodium carbonate. The procedure yielded almost completely soluble waste at a minimum total volume. The MW remained in the tank until the third quarter of 1953 when a sluice mining program for recovery of the uranium was started. Virtually no solids were left after the last transfer of the slurry.

The tank was again filled to capacity during July-August 1954 with Tributyl Phosphate (TBP) waste. This material was generated on a 1:1 ratio in the processing of MW to recover the uranium. The treatment involved addition of Potassium Ferrocyanide ($K_4Fe[CN]_6$) to act as a scavenging agent for cesium. In April 1956, the tank was pumped to a 79,000 gallon heel and the record states a sludge volume of 15,000 gallons. This was the first reported solids measurement.

In August 1956 the tank commenced service as a receiver for Purex Coating Waste (CW) enroute to the 241-BY Tank Farm and to other tanks within the 241-C Farm. The tank remained full and static from mid 1960 to the second quarter 1963 when it was pumped to a 125,000 gallon heel, as shown in Table I, there was no record of a sludge measurement. Then, during the last quarter of 1963, the first transfer of Purex Neutralized High Level Waste was received from TK-102-A. The ending volume was 532,000 gallons, and a solids volume of 109,000 gallons was recorded. Of significant note was the fact of a recorded 36-inch liquid level decrease during the static between the time of fill and the fourth quarter 1967. The records claim that the loss was due to "steaming", but there is no documentation of either decrease studies or temperature data. A 109,000 gallon sludge volume was first recorded in 1965 (two years after the PSN transfer).

From 1967 until February 1977, Tank 241-C-105 served as a receiver for Purex Supernatant Waste (PSN) and Purex Sludge Wash Waste (PSS) from the 241-A and 241-AX farms and also from TK-103-C and TK-106-C. Although administrative controls were applied to prevent/minimize it, some A, AX solids were believed to have been transported to TK-105-C. This material was then pumped to the 221-B Bldg. for cesium IX recovery processing. The tank pump was equipped with a floating suction, and administrative controls were applied to maintain a minimum liquid level limit (76 inches) to prevent sludge transport. The most recent measurement indicates a sludge volume of 154,000 gallons.

TK-106-C

Tank 241-C-106 commenced waste storage service in July 1947 as the third tank in cascade. Between that date and August 1963, the process history was virtually identical with that of Tank 241-C-105. The recorded sludge volume at the end of that period was 62,000 gallons.

The tank was filled to capacity with PSN from Tank 241-A-102 during the last quarter of 1963, and no further transfers were made until 1968. After being pumped to a minimum 8,000 gallon liquid heel (over 62,000 gallons of sludge) by the end that year, the tank was next used in conjunction with Purex sludge processing at the 244-AR Vault. The flowsheet for this operation included a step for washing the accumulated slurry with water to remove soluble constituents. The wash solution (PSS) was then supposed to be decanted from the solids to the Tanks 106-C and 103-C. These tanks were subsequently pumped to Tank 105-C for transhipment to the B Plant for cesium recovery processing. Throughout this period of use, material balances for both sludge and strontium 89-90 showed large values for material unaccounted for (MUF) estimated at greater than 12 MCi strontium 89-90. (reference 3)

The above flowsheet was maintained until mid 1971 when sludge temperature increases to above 100°C were observed. As it was obvious that unacceptable quantities of strontium had been transferred with the PSS, and that the tank was not equipped for the storage of self boiling waste, the use of both TK-103-C(*) and TK-106-C as PSS receivers was immediately stopped (see references 1 and 2). The reference 2 letter requested that Tanks 105-C and 106-C be immediately placed on a vessel ventilation system and that sludge samples be obtained.

A sludge volume measurement at the time indicated 150,000 gallons of sludge. However, subsequent data in 1973 and 1975 indicate 125,000 and 106,000 gallons respectively. The tank has most recently been used

(*) TK-103-C received PSS waste from TK-106-C only, whereas transfers from the 241-CR Vault TK-002-AR were routed only to TK-106-C.

as a receiver for B Plant complexant waste. The most recent sludge measurement in February 1977 indicates a volume of 140,000 gallons.

The two tanks remained connected in parallel to an operating 7000 cfm exhauster (reference 8) until March 1976, when it was determined that the unit (including the ductwork from TK-106-C) was too severely contaminated to permit routine maintenance. Nominal flows in each tank were in the range of 2000 to 2500 cfm. A second exhauster of the same type was then installed to exhaust TK-106-C only. Air flow rates recorded for this arrangement were in the range of 3200 cfm. Service by the replacement was maintained through October 1976, when the same conditions of excessive contamination, transported from TK-106-C, necessitated its removal and burial. A third exhauster, also of 7000 cfm capacity, was installed during November to provide evaporative cooling to both tanks as shown in Figure 1, page 6. In addition to the series arrangement, the most important modification was the replacement of the steam preheater with CAL ROD heating elements. Operation in this mode will be maintained until facilities for final disposition of the tanks have been defined.

Investigative Studies

Sludge Analyses

A sample of the Tank 241-C-105 sludge was taken during 1972 and submitted to the Separations Chemistry Laboratory for compositional analysis. The sludge level reading at that time indicated a solids volume of 98,000 gallons, but a reliable estimate of the actual thickness of the upper sludge layer representing the PSN transfers cannot be made with any degree of accuracy. By February 1977 this volume had increased to 154,000 gallons. The fact that the point at which the sample was taken contained significant quantities of strontium 89-90 was confirmed by the laboratory report of analysis results. These data are listed in Table III, page 23 and indicate a sludge more typical of that found in the A-Farm tanks than that of the AX Farm. Transfers since 1972 were AX Farm PSN and PSS, the latter of which would be expected to have much higher strontium contents in any transported solids.

Using the reported strontium analyses result and the current measured sludge volume of 154,000 gallons, the estimated strontium 89-90 contents of the tank sludge is in excess of 4.8 MCi.. The calculated heat generation rate is therefore approximately 92,000 BTU/hours.

Tank 241-C-106 was sampled in 1971 (reference 3) and again in 1975, and the results of laboratory analysis are listed in Table III, page 23. Using the reference 3 and 1975 values for strontium 89-90, and the volume of sludge accumulated during PSS operations the total estimated strontium content ranges from greater than 10 MCi to less than 5 MCi. In the least case, the calculated heat generation rate for the strontium constituent alone is greater than 115,000 BTU/hour.

Tank Temperature Record

Both tanks 241-C-105 and 241-C-106 are equipped with standard 14-point iron-constanton type J thermocouple probes at the riser locations shown in Figure 1, page 8. The data presented in Tables IV and V, pages 24 and 25 are representative summaries of the tank temperatures recorded since 1974. Earlier data is not available. With the exceptions of the periods denoted on the tables, the tanks were connected to an operating exhauster; the connection was parallel prior to March 1976 and series (TK-105-C to TK-106-C) after November 25, 1976. TK-105-C was not connected to an exhauster during the interim between March and November. However, A 3-inch cascade line does provide an intertie between the two tanks, and studies have shown that it could accomodate an air flow of up to 409 cfm under conditions provided by the TK-106-C exhauster. Of significant note is the fact that the average bulk temperature increase during this period was greater than 17°C.

Temperature readout for the two tanks is different. For TK-105-C, the thermocouples are connected to a strip chart recorder housed within an instrument enclosure. Analysis of the data obtained during periods when the tank has been static indicate measurement precision of $\pm$ 1.4°C. Whereas the TK-106-C readout is obtained through use of a portable instrument at the tank above ground connectors. Analysis

of the data thus obtained indicate a variance as great as ± 5.7°C. Factors of effect have been identified and a program for correction of the discrepant data has been instituted.

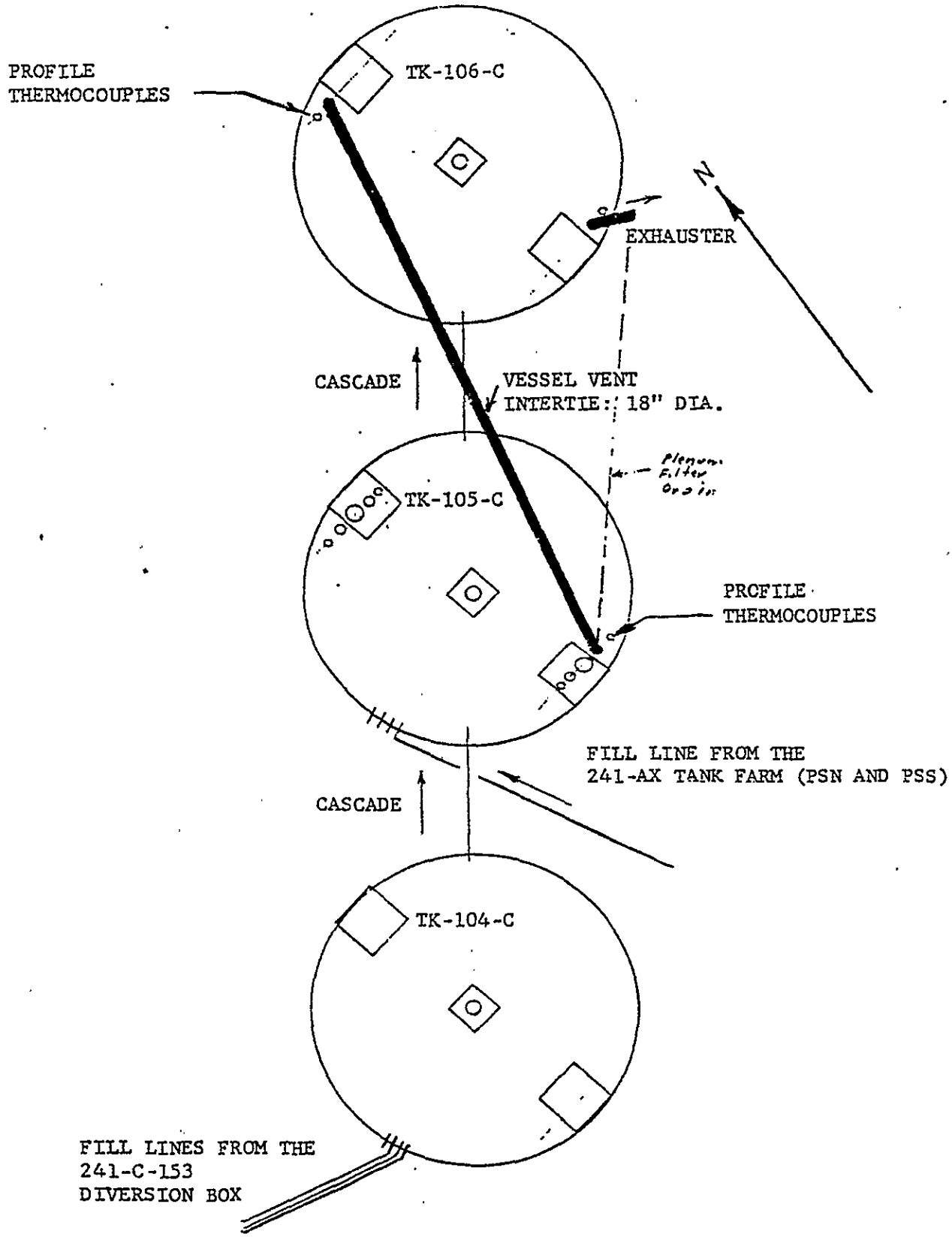
It should also be noted that the locations of the thermocouple probes are such that the data are not properly representative of the actual temperature status of either tank. A more desirable placement would be within twelve feet of the tank centers and in the same quadrants as the PSS and PSN fill lines. A request for installation of additional probes at these locations has been submitted to Tank Farm Operations. (reference 9).

Psychrometric Survey Data

Tank 241-C-105 and 241-C-106 are connected in series to a 7,000 cfm exhauster as shown in Figure 1. Access parts are provided at the locations indicated for the insertion of psychrometric monitor instrumentations, and a program for routine data procurement has been defined. The results thus obtained is summarized in Table VI, page 26. As is shown these data are variable and subject to the recognized deficiencies of a monitor of only one instant of time. Of particular concern is the observed variation of the flow measurements. The reason for the variance is not known at this time.

Facilities for continuous monitor of both air flow and psychrometry information over extended periods will be available after May 10, 1977. Their application to this system will resolve some of the noted discrepancies, the most important of which are the variables introduced by the continuing service of Tank 106-C as a receiver of B Plant waste. The Table VI data do however provide a valid basis for the conclusion that the rates of heat generation for both of the tanks are in excess of the amounts that can be dissipated by natural means.

SCHEMATIC DIAGRAM OF THE TK-104-C, TK-105-C, AND TK-106-C PLOT PLAN



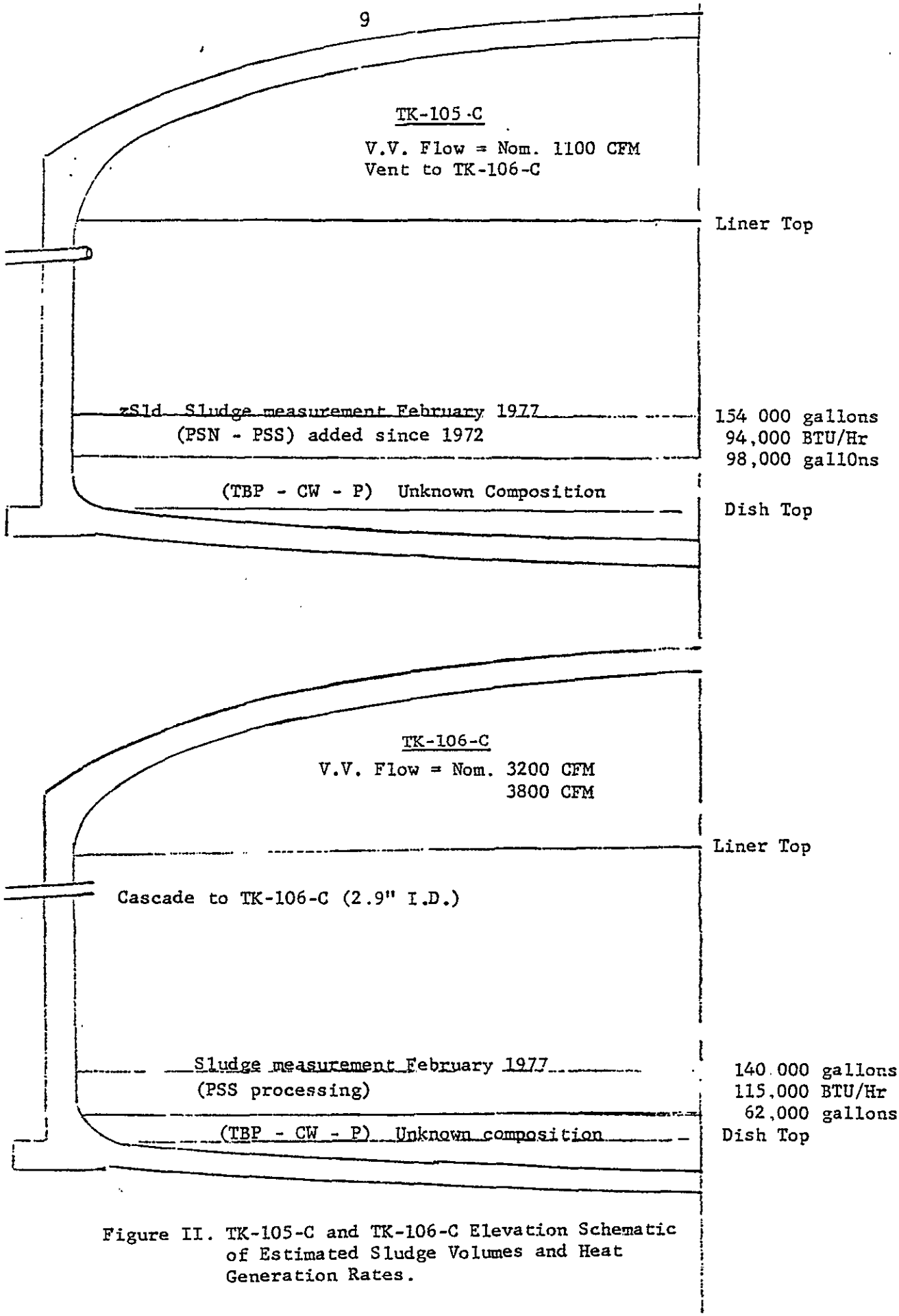


Figure II. TK-105-C and TK-106-C Elevation Schematic of Estimated Sludge Volumes and Heat Generation Rates.

TABLE I

Waste Status Summary of Tank 105-C - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1944-1	---	---	---	---	
2	---	---	---	---	
3	---	---	---	---	
4	---	---	---	---	
1945-1	---	---	---	---	
2	---	---	---	---	
3	---	---	---	---	
4	---	---	---	---	
1946-1	---	---	---	---	
2	---	---	---	---	
3	---	---	---	---	
4	---	---	---	---	
1947-1	MW	208	---	---	Second in Cascade, Began filling Feb 1947
2	MW	528	---	---	Full in June 1947
3	MW	528	---	---	Cascading to 106-C
4	MW	528	---	---	Cascade full in November 1947
1948-1	MW	528	---	---	
2	MW	528	---	---	
3	MW	528	---	---	
4	MW	528	---	---	
1949-1	MW	528	---	---	
2	MW	528	---	---	
3	MW	528	---	---	
4	MW	528	---	---	

Waste Status Summary of Tank 105-C - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1950-1	MW	528	---	---	
2	MW	528	---	---	
3	MW	528	---	---	
4	MW	528	---	---	
1951-1	MW	528	---	---	
2	MW	528	---	---	
3	MW	528	---	---	
4	MW	528	---	---	
1952-1	MW	530	---	---	
2	MW	530	---	---	
3	MW	530	---	---	
4	MW	530	---	---	
1953-1	MW	530	---	---	1507 in 101 thru 106-C. Removed thru batch CR 1818
2	MW	530	---	---	
3	MW	202	---	---	MW removal in progress.
4	MW	48	---	---	MW removal in progress.
1954-1	MW	453	453	---	Supernatant. Sluiced until 1-08-54.
2	---	---	---	---	Transferred MW supernate to 104-C. (Last transfer in June)
3	TBP	546	546	---	Received TBP waste during July
4	TBP	546	546	---	
1955-1	TBP	546	546	---	
2	TBP	546	546	---	
3	TBP	546	546	---	
4	TBP	546	546	---	

Waste Status Summary of Tank 105-C - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1956-1	TBP	252	252	---	Pumped in March
2	TBP	79	64	15 (TBP)	Scavenging finished in April
3	TBP-CW	508	64-429	15	Received 429 from 104-C in August
4	TBP-CW	508	64-429	15	
1957-1	TBP-CW	538	79-459	---	Latest electrode reading
2	TBP-CW	406	79-327	---	300M pumped to 111-BY
3	TBP-CW	178	79-99	---	SS 250M to 112BY, read 98"-SS Rec'd 121M CW
4	TBP-CW	381	79-302	---	SS 380 CW rec'd, 185 to BY
1958-1	TBP-CW	475	79-396	---	3.95 CW rec'd, 298 to 110-BY
2	TBP-CW	541	79-462	---	SS 35 CW received
3	TBP-CW	541	79-462	---	
4	TBP-CW	461	79-382	---	SS 291 CW rec'd 471 to 107 and 110-BY
1959-1	TBP-CW	271	79-192	---	SS 285 CW rec'd, 170 to 107-BY, 305 to 108-BY
2	TBP-CW	142	79-63	---	SS 324 CW rec'd, 261 to 109-C
3	TBP-CW	309	79-230	---	SS 361 CW rec'd 154 to 109-C
4	TBP-CW	431	79-352	---	SS 309 CW rec'd, 187 to 111-C
1960-1	TBP-CW	461	79-382	---	SS 314 CW rec'd, 65 acid flush, 29 to 105-C
2	TBP-CW	529	79-450	---	SS 66 CW rec'd, latest electronic reading
3	TBP-CW	529	79-450	---	
4	TBP-CW	529	79-450	---	
1961-1					
2	TBP-CW	521	79-442	---	
3					
4	TBP-CW	521	79-442	---	

Waste Status Summary of Tank 105-C - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1962-1					
2	TBP-CW	519	79-440	---	Latest Electrode reading
3					
4	TBP-CW	519	79-440	---	
1963-1					
2	CW	125	125	---	29 Cl to 102-C
3					
4	CW-P	532	125-407	---	407 from 102-A
1964-1					
2	CW-P	522	125-397	---	New electrode
3					
4	CW-P	516	125-391	---	New electrode (read confirmed)
1965-1					
2	CW-P	491	? 125-257	109	25 lost from steaming
3	CW-P	491	? 125-257	109	
4	CW-P	483	? 125-249	109	
1966-1	CW-P	475	? 125-241	109	
2	CW-P	450	? 125-216	109	New electrode
3	CW-P	450	? 125-216	109	
4	CW-P	442	? 125-208	109	8 loss from steaming
1967-1	CW-P	439	125-205	109	
2	CW-P	435	125-201	109	
3	CW-P	431	106-216	109	4 Evaporation
4	CW-P	359	106-144	109	Feed Tank PSN to B-pH, 72 pumped.

Waste Status Summary of Tank 105-C - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1968-1	P	542	433	109	Rec'd 656 PSN, 470 to 221-B
2	P	392	283	109	264 PSN from 102-AX, 404 to 221-B
3	P	444	335	109	255 from 102-AX, 204 to 221-B IX
4	P	384	288	96	410 from 102-AX, 470 to 221-B IX Col.
1969-1	P	378	269	609	334 from 102-AX, 532 from 104-A, 866 from A-AX Farms, 872 to B Plant IX
2	P	490	391	99	706 from A Farm, 580 to B Plant IX
3	P	366	227	139	501 from A Farm, 326 from 103-C, 10 from flushing, 960 to B Plant IX
4	P	450	217	233	609 from 102-A, 580 from 101-C and 106-C 1,106 to B Plant IX
1970-1	P	348	225	123	171 from 102-A, 267 to B Plant IX
2	BL	198	62	136	208 from 102-A, 798 from 103-C, 1155 to B Plant IX (contained BL requiring a reduction in cesium prior to in-tank solidification)
3	BL-H_2O-R	497	29-53-276	139	Rec'd 454 of Redox waste and 87 of dilution water from 101-TX, B Plant IX rec'd 230 (BL-18, water-34, R-128) from 105-C
4	H_2O-RSN	447	33-258	156	Rec'd 485 RSN and 17 water from 101-TX, 228 RSN from 105-TX, 681 RSN from 102-TX, and 158 of dilution water. B Plant IX rec'd 1619 as follows: 1412 of RSN, 195 of water, 12 of BL.

Waste Status Summary of Tank 105-C - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1971-1	PSS	211	49	162	561 RSN and 127 dilution water from 106-TX,
2	PSS	211	47	164	and 827 PSS from 106-C, B Plant IX rec'd
3	PSS	216	52	164	1748 as follows; RSN 819, H_2O 160, PSS 769.
4	PSS	253	89	164	
1972-1	PSS	510	412	98	264 from 103-B
2	PSS	400	302	98	384 from 101-A, 302 from 103-A, 795 to B Plant (TK 17-2)
3	P Water	471	328-45	98	969 from 103-AX, 34 from 104-C, 250 water 1182 to B Plant (TK 17-2).
4	P	411	313	98	921 from 103-AX, 141 from 104-BX, 1123 to B Plant (TK 17-2)
1973-1	P	326	228	98	844 from 103-AX, 930 to B Plant (TK 17-2)
2	PSS	227	115	112	1266 from 103-AX, 1363 to B Plant (TK 17-2)
3	PSS	239	127	112	
4	PSS	234	122	112	
1974-1	PSS	447	335	112	219 from 103-AX
2	PSS	442	330	112	
3	PSS	321	119	112	203 to B Plant
4	PSS	279	140	139	59 from 103-AX
1975-1	PSS	224	85	139	127 from 103-AX, 178 to B Plant
2	PSS	233	94	139	525 from 103-AX, 516 to B Plant
3	PSS	235	96	139	544 from 103-AX, 125 water, 665 to B Plant
4	PSS	483	344	139	490 from 103-AX, 119 water, 361 to B Plant

Waste Status Summary of Tank 105-C - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1976-1	PSS	381	242	139	234 from 104-AX, 15 water, 3.6 from 103-AX, 384 to B Plant
2					
3					
4					
1977-1				154,000	
2					
3					
4					

TABLE II

Waste Status Summary of Tank 106-C Tank - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1944-1	---	---	---	---	
2	---	---	---	---	
3	---	---	---	---	
4	---	---	---	---	
1945-1	---	---	---	---	
2	---	---	---	---	
3	---	---	---	---	
4	---	---	---	---	
1946-1	---	---	---	---	
2	---	---	---	---	
3	---	---	---	---	
4	---	---	---	---	
1947-1	---	---	---	---	
2	---	---	---	---	
3	MW	388	---	---	Third in Cascade, Began filling July 1947
4	MW	528	---	---	Full in November 1947
1948-1	MW	528	---	---	
2	MW	528	---	---	
3	MW	528	---	---	
4	MW	528	---	---	
1949-1	MW	528	---	---	
2	MW	528	---	---	
3	MW	528	---	---	
4	MW	528	---	---	

Waste Status Summary of Tank 106-C Tank - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1950-1	MW	528	---	---	
2	MW	528	---	---	
3	MW	528	---	---	
4	MW	528	---	---	
1951-1	MW	551	---	---	23 water from hose
2	MW	551	---	---	
3	MW	551	---	---	
4	MW	551	---	---	
1952-1	MW	519	---	---	
2	MW	519	---	---	
3	MW	519	---	---	
4	MW	519	---	---	
1953-1	MW	---	---	---	1507 in 101 thru 106-C. 1651 removed thru CR 1218
2	MW	76	---	---	Supernatant supply
3	MW	439	---	---	Received MW supernatant from 103-C
4	MW	143	---	---	MW supernatant blend tank
1954-1	MW	50	---	---	MW supernatant blend tank
2	MW	50	---	---	MW supernatant blend tank
3	TBP	538	538	---	Received TBP waste during August
4	TBP	538	538	---	
1955-1	TBP	538	526	12 (TBP)	
2	TBP	538	526	12	
3	TBP	538	526	12	
4	TBP	538	526	12	

Waste Status Summary of Tank 106-C Tank - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1956-1	TBP	538	526	12	
2	TBP	538	526	12	
3	TBP	538	526	12	
4	TBP	538	526	12	
1957-1	TBP	519	507	12	Latest electrode reading enough for 171 TU
2	P	37	25	12	Rec'd 234 from 101-A and 77 from 102-A, 476 Scvg. during month!
3	TBP-P	524	31-481	12	Rec'd 170 from 102-A (CW)
4	TBP-P	106	14-63	29	New electrode reading, 456 to 103-BY
1958-1	TBP-P	106	14-63	29	
2	TBP-P-CW	232	14-63-126	29	
3	TBP-P-CW	519	14-63-413	29	7 to 110-BX, SS 294 CW rec'd
4	TBP-P-CW	535	14-64-429	29	Latest electrode reading
1959-1	TBP-P-CW	510	14-63-429	29	
2	TBP-P-CW	510	14-63-429	29	
3	TBP-P-CW	510	14-63-429	29	
4	TBP-P-CW	510	14-63-429	29	
1960-1	TBP-P-CW	510	14-63-429	29	
2	TBP-P-CW	527	14-63-421	29	SS 17 CW rec'd
3	TBP-P-CW	527	14-63-421	29	
4	TBP-P-CW	527	14-63-421	29	
1961-1					
2	TBP-P-CW	527	14-63-421	29	
3					
4	TBP-P-CW	527	14-63-421	29	

Waste Status Summary of Tank 106-C Tank - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1962-1					
2	TBP-P-CW	527	14-63-421	29	
3					
4	TBP-P-CW	527	14-63-421	29	
1963-1					
2	TBP-P-CW	530	19-63-421	24	
3					
4	P	538	514	24	427 From 102-A
1964-1					
2	P	522	498	24	New electrode
3					
4	P	505	481	24	
1965-1					
2	P	541	479	62	36 from CR Vault
3	P	546	484	62	
4	P	549	487	62	
1966-1	P	549	487	62	
2	P	519	457	62	New electrode
3	P	519	457	62	
4	P	527	465	62	New electrode
1967-1	P	527	465	62	
2	P	527	465	62	
3	P	527	465	62	
4	P	527	465	62	

Waste Status Summary of Tank 106-C Tank - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1968-1	P	66	4	62	461 PSN to 105-C
2	P	72	10	62	
3	P	70	8	62	
4	P	70	8	62	
1969-1	P	124	62	62	54 from 002AR (101-A sludge wash)
2	P	244	182	62	120 from 002AR Sludge washes
3	P	293	231	62	50 from 002AR Sludge washes
4	P(PSS)	167	110	57	52 from 002AR, 176 to 105-C
1970-1	P(PSS)	222	165	57	55 from 002AR
2	P(PSS)	379	313	57	149 from 002AR
3	P(PSS)	517	438	79	216 from 002AR, 69 to 103-C
4	PSS	530	385	145	303 from 002AR, 99 to 103-C, 194 to 102-A
1971-1	PSS	212	62	150	131 from 002AR, 444 from 103-C, 194 from 102-A, 257 to 103-C, 837 to 105-C
2	PSS	212	62	150	
3	H_2O-PSS	239	63-26	150	63 water
4	H_2O-PSS	235	59-26	150	16 water, 22 CW Density
1972-1	PSS	233	83	150	
2	PSS	235	110	125	
3	PSS	244	119	125	
4	PSS	248	123	125	
1973-1	PSS	255	130	125	
2	PSS	249	124	125	
3	PSS	241	116	125	
4	PSS	238	113	125	

Waste Status Summary of Tank 106-C Tank - Capacity

Year-Qtr	Type Waste	Total Volume	Liquid in Storage	Solids in Storage	Remarks
1974-1	PSS	237	112	125	
2	PSS	250	125	125	
3	PSS-BL	324	45-154	125	283 from B Plant, 15 from 154-B Catch Tank, 3 water, 221 to 103-AX
4	BL	420	314	106	506 from B Plant, 1 water, 409 to 103-C
1975-1	BL	323	267	106	356 From B Plant, 404 to 103-C
2	BL	345	239	106	236 from B Plant, 7 from 302 CT, 258 to 103-C
3	BL	469	363	106	242 from B Plant, 101 to 104-C
4	BL	288	182	106	414 from B Plant, 595 to 104-C
1976-1	BL	329	223	106	581 from B Plant, 477 to 104-C
2					
3					
4					
1977-1				140	
2					
3					
4					
1978-1					
2					
3					
4					

TABLE III

Analytical Data Reported for
TK-105-C and TK-106-C Sludge Samples

Tank 105-C:

Reference: Letter, November 10, 1972, J. S. Buckingham to C. M. Walker, "Analysis of Sludge Sample from TK-105-C"

Density, damp (centrifuged) sludge	1.52
Percent H_2O	47.1

Fission product analysis of oven-dried sample, μCi/gram

Sr	1.49×10^4
^{137}Cs	1.73×10^3
^{134}Cs	18
$^{144}Ce^{144}Pr$	1.08×10^2
^{154}Eu	24
^{155}Eu	79
^{125}Sb	26
^{106}Rh	13
^{98}Zr	3
^{57}Co	11
^{60}Co	13

The ratio of $^{89+90}Sr$ to $^{144}Ce^{144}Pr$ = 128.

Tank 106-C:

Reference: Letter, January 6, 1975, J. E. Horton to O. R. Rasmussen, "Analysis and Characterization of Sludge Sample from TK-106-C"

Analysis of 106-C "AS RECEIVED" Sludge

Si	0.136	moles/ℓ
Fe	1.78	moles/ℓ
Mn	0.56	moles/ℓ
Mg	0.09	moles/ℓ
Ca	0.20	moles/ℓ
Ba	<0.04	moles/ℓ
Al	34.02	moles/ℓ
Sr	0.006	moles/ℓ
Pu_M	0.06	g/ℓ
$^{89\ 90}Sr_M$	1.88×10^7	μc/ℓ
^{137}Cs	8.62×10^5	μc/ℓ

NOTE: The reference 3 letter states 2.84×10^4 μCi Sr 89-90/gm of dry sludge.

TABLE IV

TK-106-C Temperature Record, Degrees Celcius

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Liquid Level
1971	(See data plot figure 2)														
August 1974	80	56	NG	57	57	55	52	52	52	NG	48	42	36	32	85.00
December 1974	78	39	NG	41	32	36	29	29	27	NG	15	13	NG	12	118.4
June 1975	91	51	NG	44	35	35	35	35	34	NG	25	24	23	23	94.8
December 1975	89	46	NG	40	34	34	24	24	23	NG	24	22	18	18	137.0
June 1976	94	57	NG	43	43	43	43	24	23	NG	24	22	19	19	173.7
Nov. 1976	90	78	NG	62	43	33	26	26	25	NG	26	24	-	-	144.8
Nov. 27, 1976	90	79	NG	64	46	32	32	31	31	NG	31	30	30	30	114.8
New exhauster installed 11-27-76															
January 1977	80	67	NG	48	45	45	45	45	45	NG	42	39	32	32	80.4
February 1977	67	52	NG	42	42	40	26	26	26	NG	28	23	23	23	131.9
March 1977	67	52	NG	43	43	40	40	40	40	NG	29	26	23	23	145.0

NOTE: Measurement precision equals ± 5.7

TABLE V

TK-105-C Temperature Record, Degrees Celcius

	1	2	3	4	5	6	7	8	9	10	11	12	13	1	Liquid level
December 1973	37	35				24									
June 1974	54	52	46	46	42	42	35	32	31	30	27	24	24	24	157.05
Dec. 1974	40	35	31	31	22	22	22	22	22	18	15	10	10	10	76.35
June 1975	40	38	35	37	37	37	25	25	24	24	22	22	26	26	143.75
Dec. 1975	52	48	42	42	42	34	34	34	34	34	35	35	32	32	83.8
Feb. 1976	52	50	46	46	43	41	41	33	33	33	34	34	25	24	175.2
(Tank removed from exhauster 3-10-76 (vented to TK-106-C via cascade)															
April 1976	55	50	51	48	48	48	47	46	45	44	43	34	29	29	
May 1976	56	50	51	50	48	48	48	48	48	47	47	43	43	43	
June 1976	58	49	54	52	51	50	50	49	49	47	46	46	43	43	76.4
August 1976	60	51	57	54	54	54	54	54	54	53	52	50	50	50	
Nov. 1976	65	60	58	58	58	55	55	55	55	35	55	55	55	55	115.4
	Tank connected to exhauster 11-28-76														
Dec. 1976	63	51	53	53	53	49	49	48	47	47	42	38	25	24	114.2
Dec. 25, 1976	59	52	47	47	44	43	44	44	43	40	40	35	25	25	103.7
Jan. 23, 1977	55	45	48	48	45	45	45	45	45	40	35	NG	30	30	99.3
Feb. 8, 1977	53	42	42	38	38	38	38	38	38	36	33	NG	32	32	77.0
Mar. 30, 1977	50	39	40	37	37	38	38	38	38	38	35	35	35	35	76.8

NOTE: Measurement precision equals ± 1.4

TABLE VI

PSYCHROMETRIC SURVEY DATA: TK-105-C TK-106-C

TK-105-C	8-29-74	9-4-74	12-10-74	5-12-75	9-16-76	11-28-76	11-30-76	12-2-76	12-3-76	3-8-77	4-11-77
Wet bulb, °F	76	76	60	69	Not on exh.	89	87	86	84	61*	77
Dry bulb °F	90	92	88	80		89	87	86	85	62*	91
Flow, cfm	2050	2011	2166	1608		823	508	699	978	1050	1106
L.L. change inch/wk.	-0.55	-0.48	-0.33	-0.43		-0.72	-0.39	-0.53	-0.66	-0.25	-0.35
Heat loss BTU/hr	110,000	103,000	101,800	79,600		150,864	103,122	122,000	159,100	51,333	87,000
TK-106-C											
Wet bulb, °F	86	No data	60	No data	77	66	69	60	61	60	70
Dry bulb, °F	97		68		87	74	66	68	67	71	90
Flow, cfm	1360		2551		3237	3635	2442	3518	3413	2950	3310
L.L. Change, in./wk.	-0.61		-0.37		-1.14	-0.48	-0.24	-0.25	-0.24	-0.45	-0.37
Heat loss, BTU/hr.	137,000		109,700		260,800	183,556	98,900	161,540	130,300	92,889	109,000

* Data suspect

REFERENCES

1. Letter, September 2, 1971, G. L. Borsheim to P. W. Smith, "TK-105-C Evaluation"

2. Letter, September 7, 1971, W. P. Metz to L. W. Roddy "Recommended Action - TK-106-C"

3. ARH-2446 (unclassified), April 10, 1972, M. M. Beary, "Engineering Study - Sludge Processing Facilities for TK-106-C"

4. Document (draft) "Design Criteria - 241-C Sludge Cooler" C. M. Walker, December 1976.

5. ARH-1430 (unclassified), November 3, 1969, T. P. McKnight, "Design Criteria - Sludge Cooling Facilities for the 241-SX Farm"

6. ARH-1422 (unclassified), October 31, 1969, D. M. Felton, "Design Criteria - 242-T Evaporator Waste Concentrate Facilities Tanks 102-TX, 105-TX and 106-TX"

7. ARH-1870 (unclassified), November 6, 1970, T. P. McKnight, "Design Criteria Supplement - Additional Cooling Facilities for Tanks Associated with the 242-T and ITS-2 Units"

8. Drawing H-2-35769, "Heating and Ventilating Details Mobile Exhaust Unit"

9. Letter, March 31, 1977, C. M. Walker to J. A. Teal, Request for Installation of additional temperature probes in TK-241-C-105 and 241-C-106.

10. Letter, September 3, 1974, J. A. Atherton to R. C. Roal, "Psychrometric Data, Tanks 105-C and 106-C.